CLAIMS

1. A method of transmitting optical signal traffic, comprising:

providing an all optical network with at least two rings that are geographically dispersed, each ring including at least one transmitter and at least one receiver;

separating the available wavelengths into distinct ring bands;

sharing the optical signal traffic throughout the entire optical network; and

providing each ring with its own distinct ring band of the optical signal traffic, wherein all of the optical signal traffic is transmittable throughout the optical network and each receiver is configured to receive only wavelengths in a ring band designated for its associated ring.

2. The method of claim 1, wherein all of the ring bands have a same number of optical signals.

3. The method of claim 1, wherein at least a portion of the ring bands have a same number of optical signals.

4. The method of claim 1, wherein all of the ring bands have a different number of optical signals.

5. The method of claim 1, wherein at least a portion of the ring bands have different numbers of optical signals.

6. The method of claim 1, wherein none of ring bands share common wavelengths.

7. The method of claim 1, wherein all of the optical network traffic is included in the ring bands.

8. The method of claim 1, wherein each ring includes at least two nodes.

9. The method of claim 8, wherein each node includes at least one transmitter and one receiver.

10. The method of claim 1, wherein each ring in the optical network includes at least a first and a second fiber with all of the optical signal traffic traveling in both of the first

and second fibers, wherein the optical signal traffic travels in a clockwise direction in the first fiber and in a counter-clockwise direction in the second fiber.

11. The method of claim 1, wherein the first and second protection fibers are each coupled to a 1×1 or 1×2 switch.

12. The method of claim 11, further comprising:

maintaining the 1x1 or 1×2 switch in an open position when there is no break point in an associated ring, and closing the 1x1 or 1×2 switch upon an occurrence of a break point in the associated ring.

13. The method of claim 12, further comprising:

discovering a break point in an ring by monitoring an optical supervision signal that travels through the associated ring.

14. The method of claim 1, wherein the optical network includes a 1×2 band-splitter and a 2×1 coupler that couples the optical signal traffic between the at least two rings.

15. The method of claim 1, further comprising:

coupling the optical signal traffic between the at least first and second rings through the 1x2 band-splitter and the 2x1 coupler.

16. The method of claim 1, wherein each ring in the optical network includes a fiber with the same signal traffic duplicated in two different bands that travel in both clockwise and counter-clockwise directions.

17. The method of claim 1, wherein the optical network includes, first, second and third rings, each ring including a first and a second protection fibers with all of the optical signal traffic traveling in both of the first and second protection fibers, wherein the optical signal traffic travels in a clockwise direction in the first protection fiber and in a counter-clockwise direction in the second protection fiber.

18. The method of claim 17, wherein each of the first and second protection fibers is coupled to a 1×1 switch.

19. The method of claim 1, wherein the optical network further includes a first and second MxM optical switches, where M is the total number of ring bands.

20. The method of claim 19, further comprising:

coupling the optical signal traffic between the at least first and second rings with the first and second MxM switches, wherein the first MxM switch routes the optical signal traffic in a clockwise direction, and the second MxM switch routes the optical signal traffic in a counter- clockwise direction.

21. A method of transmitting optical traffic, comprising:

providing an all optical network with at least two rings that are geographically dispersed, each ring including at least one transmitter and at least one receiver;

sharing a sufficiently large enough number of wavelengths in the at least two rings to eliminate O-E-O conversions between the rings;

sharing the optical signal traffic throughout the entire optical network; and

providing each ring with its own distinct ring band of the optical signal traffic, wherein all of the optical signal traffic is transmittable throughout the optical network and each receiver is configured to receive only wavelengths in a ring band designated for its associated ring.

22. The method of claim 21, wherein all of the ring bands have a same number of optical signals.

23. The method of claim 21, wherein at least a portion of the ring bands have a same number of optical signals.

24. The method of claim 21, wherein all of the ring bands have a different number of optical signals.

25. The method of claim 21, wherein at least a portion of the ring bands have different numbers of optical signals.

26. The method of claim 21, wherein none of ring bands share common wavelengths.

27. The method of claim 21, wherein all of the optical network traffic is included in the ring bands.

28. The method of claim 21, wherein each ring includes at least two nodes.

29. The method of claim 28, wherein each node includes at least one transmitter and one receiver.

30. The method of claim 21, wherein each ring in the optical network includes at least a first and a second fibers with all of the optical signal traffic traveling in both of the first and second fibers, wherein the optical signal traffic travels in a clockwise direction in the first fiber and in a counter-clockwise direction in the second fiber.

31. The method of claim 21, wherein the first and second protection fibers are each coupled to a 1×1 or 1×2 switch.

32. The method of claim 31, further comprising:

maintaining the 1x1 or 1×2 switch in an open position when there is no break point in an associated ring, and closing the 1x1 or 1×2 switch upon an occurrence of a break point in the associated ring.

33. The method of claim 32, further comprising:

discovering a break point in an ring by monitoring an optical supervision signal that travels through the associated ring.

34. The method of claim 21, wherein the optical network includes a 1×2 band-splitter and a 2×1 coupler that couples the optical signal traffic between the at least two rings.

35. The method of claim 21, further comprising:

coupling the optical signal traffic between the at least first and second rings through the 1x2 band-splitter and the 2x1 coupler.

36. The method of claim 21, wherein each ring in the optical network includes a fiber with the same signal traffic duplicated in two different bands that travel in both clockwise and counter-clockwise directions.

37. The method of claim 21, wherein the optical network includes, first, second and third rings, each ring including a first and a second protection fibers with all of the optical signal traffic traveling in both of the first and second protection fibers, wherein the optical signal traffic travels in a clockwise direction in the first protection fiber and in a counter-clockwise direction in the second protection fiber.

38. The method of claim 37, wherein each of the first and second protection fibers is coupled to a 1×1 switch.

39. The method of claim 21, wherein the optical network further includes a first and second MxM optical switches, where M is the total number of ring bands.

40. The method of claim 39, further comprising:

coupling the optical signal traffic between the at least first and second rings with the first and second MxM switches, wherein the first MxM switch routes the optical signal traffic in a clockwise direction, and the second MxM switch routes the optical signal traffic in a counter- clockwise direction.

41. A method of transmitting optical signal traffic, comprising:

providing an all optical network with hierarchical rings, each of a hierarchical ring including a plurality of nodes and each node including at least one transmitter and one receiver;

separating the optical signal traffic into ring bands;

transmitting the optical signal traffic through all of the hierarchical rings; and

providing each hierarchical ring with its own distinct ring band, wherein all of the available wavelengths are transmittable throughout each hierarchical ring, and the receivers of a hierarchical ring are configured to receive only wavelengths in a ring band that is designated for that hierarchical ring.

42. An all optical network for optical signal traffic, comprising:

at least a first and a second ring, each ring having at least one transmitter and one receiver and its own distinct ring band of the optical signal traffic, wherein all of the optical signal traffic is transmittable throughout the entire all optical network and each

receiver is configured to receive only wavelengths in a ring band designated for its associated ring; and

a central hub that couples the at least first and second rings, the central hub separating the optical signal traffic into ring bands.

43. The all optical network of claim 42, wherein each ring includes at least a first and a second protection fibers that carry all of the optical signal traffic, wherein the optical signal traffic travels in a clockwise direction in the first protection fiber and in a counter-clockwise direction in the second protection fiber.

44. The all optical network of claim 42, wherein at least one 1x1 or 1X2 switch is coupled to each first and second protection fiber.

45. The all optical network of claim 44, wherein each 1x1 or 1x2 switch is maintained in an open position when there is no break point in an associated ring, and each 1x1 or 1x2 switch is closed upon an occurrence of a break point in the associated ring.

46. The all optical network of claim 42, wherein the central hub includes at least one 1×2 band-splitter and a 2×1 coupler that couple the optical signal traffic between the at least first and second rings.

47. The all optical network of claim 42, further comprising:

first and second MxM optical switches, where M is the total number of ring bands

48. The all optical network of claim 42, wherein each ring includes multiple nodes.

49. The all optical network of claim 48, wherein each node includes at least one transmitter and one receiver.

50. The all optical network of claim 42, further comprising:

at least one mesh-based long haul network coupled to the at least first and second rings.

51. The all optical network of claim 42, wherein the at least first and second rings are geographically dispersed.

52. The all optical network of claim 42, wherein the at least first and second rings are hierarchical rings.

53. The all optical network of claim 42, wherein each of the at least first and second rings includes a 2×1 coupler for adding traffic and a 1×2 coupler for dropping traffic.

54. The all optical network of claim 53, further comprising;

a broadband gain-equalizer and a gain-clamped optical amplifier positioned between the first 2×1 coupler and the second 1×2 coupler of the at least first and second rings.

55. The all optical network of claim 42, wherein all of the ring bands have a same number of optical signals.

56. The all optical network of claim 42, wherein at least a portion of the ring bands have a same number of optical signals.

57. The all optical network of claim 42, wherein all of the ring bands have a different number of optical signals.

58. The all optical network of claim 42, wherein at least a portion of the ring bands have different numbers of optical signals.

59. The all optical network of claim 42, wherein none of ring bands share common wavelengths.

60. The all optical network of claim 42, wherein all of the optical network traffic is included in the ring bands.

61. An all optical network, comprising:

a first ring with at least a first and a second protection fibers that carry all of the optical signal traffic, wherein the optical signal traffic travels in a clockwise direction in the first protection fiber and in a counter-clockwise direction in the second protection fiber, and

at least one 1x1 or a 1X2 switch coupled to each first and second protection fiber, wherein the 1x1 or 1x2 switch is maintained in an open position when there is no break point in the ring and closed upon an occurrence of a break point in the ring.

62. The all optical network of claim 61, wherein each ring includes multiple nodes.

63. The all optical network of claim 62, wherein each node includes at least one transmitter and one receiver.

64. A method of transmitting optical ring traffic, comprising:

providing a broadcast-and-select optical network; and

transmitting a sufficient number of wavelengths over a long distance in the optical network to eliminate wavelength converters and regenerators between rings in a network.

65. The method of claim 64, wherein the number of wavelengths transmitted over the long distance is sufficient to eliminate OADMs in a ring-to-ring interconnecting network.

66. The method of claim 64, wherein the number of wavelengths transmitted over the long distance is sufficient to eliminate OADMs in a ring-to-mesh interconnecting network.